

ABSTRACT

The present invention provides parallel, cable based robotic manipulators, for use in different applications such as ultra high-speed robots or positioning devices with between three to six degrees of freedom. The manipulators provide more options for the number of degrees of freedom and also more simplicity compared to the current cable-based robots. The general structure of these manipulators includes a base platform, a moving platform or end effector, an extensible or telescoping central post connecting the base to moving platform to apply a pushing force to the platforms. The central post can apply the force by an actuator (active), or spring or air pressure (passive) using telescoping cylinders. The robotic manipulators use a combination of active and passive tensile (cable) members, and collapsible and rigid links to maximize the benefits of both pure cable and conventional parallel mechanisms. Different embodiments of the robotic manipulators use either active cables only, passive cables only, or combinations of active and passive cables. An active cable is one whose length is varied by means of a winch. A passive cable is one whose length is constant and which is used to provide a mechanical constraint. These mechanisms reduce the moving inertia significantly to enhance the operational speed of the robots. They also provide a simpler, more cost effective way to manufacture parallel mechanisms for use in robotic applications.